Claims

1. A luminescent micro- or nanoparticle, characterized in that it contains luminescent substances having long luminescence decay times and said luminescent substances are essentially shielded from ambient chemical and biochemical parameters.

2. The particle as claimed in claim 1, characterized in that one or more luminescence properties of said luminescent substances, which are in particular selected from the group consisting of quantum yield, spectral characteristics, luminescence decay time and anisotropy, are essentially independent of the particular environment.

3. The particle as claimed in claim 1 or 2, characterized in that the luminescent substances are metal/ligand complexes of ruthenium(II), osmium(II) rhenium(I), iridium(III) platinum(II) and palladium(II) as central atom.

4. The particle as claimed in claim 3, characterized in that the luminescent substances are complexes with 2- or 3-dentate polypyridyl ligands such as 2,2'-bipyridine, bipyrazine, phenanthrolin, terpyridyl or derivatives thereof as ligands.

5. The particle as claimed in either of claims 3 - 4, characterized in that the luminescent compounds are the tris complexes of ruthenium(II) with 2,2'-bipyridyl, 1,10-phenanthroline, 4,4-diphenyl-2,2'-bipyridyl and 4,7-diphenyl-1,10-phenanthroline as ligands.

6. The particle as claimed in claim 1 or 2, characterized in that the luminescent substances are carbonyl complexes of Re(I) with additional diimine ligands such as derivatives of 2,2'-bipyridyl and 1,10-phenanthroline.

7. The particle as claimed in claim 1 or 2, characterized in that the luminescent compounds are porphyrin complexes of Pt(II) and Pd(II) as central atoms.

8. The particle as claimed in any of claims 1-7, characterized in that it contains an organic polymer which distinguishes itself by low absorption of water or/and minimum gas permeability.

9. The particle as claimed in claim 8, characterized in that it contains an organic polymer from the group consisting of polyacrylonitrile, poly(meth)acrylic copolymers, polyvinyl chlorides or polyvinylidene chlorides and copolymers thereof.

10. The particle as claimed in claim 9, characterized in that it contains polyacrylonitrile or polyacrylonitrile copolymers, in particular copolymers with acrylic acid, acrylic amines or/and acrylic esters.

11. The particle as claimed in any of claims 1-7, characterized in that it contains a glass which is essentially free of micropores.

12. The particle as claimed in claim 11, characterized in that

it contains a glass which has been produced according to a sol/gel process.

13. The particle as claimed in claim 11 or 12, characterized in that
it contains a sol/gel glass which has been prepared from silicon, titanium, zirconium or/and tin tetraalcoholates.

14. The particle as claimed in any of claims 1 - 13, characterized in that
its surface has been modified by reactive groups such as amino, epoxy, hydroxyl, thiol or/and carboxyl groups which make possible the covalent coupling of luminescent indicators or/and biomolecules.

15. The particle as claimed in claim 14, characterized in that
it contains luminescent indicators or/and biomolecules covalently coupled to its surface.

16. A method for preparing luminescent micro- and nanoparticles as claimed in any of claims 8 - 10, wherein the particles are precipitated from a polymer solution in which the luminescent compound is present in soluble form by adding a liquid dropwise, with the liquid being miscible with the polymer solvent but causing a reduction in the solubility of the polymer.

17. The method as claimed in claim 15, wherein the particles are precipitated from a solution comprising dimethylformamide and polyacrylonitrile or polyacrylonitrile copolymer, in which the luminescent compound is present in soluble form, by adding water or an aqueous solution dropwise.

18. The method as claimed in claim 16 or 17, wherein the particle diameter is adjusted by varying the polymer content of the solution.

19. A method for preparing luminescent micro- and nanoparticles as claimed in any of claims 8-10, wherein the luminescent compound is incorporated by diffusion from a solvent (mixture) into already prefabricated particles.

20. A method for preparing luminescent micro- and nanoparticles as claimed in any of claims 8-10, wherein the particles are formed by spraying a polymer solution in which the luminescent compound is present in soluble form and evaporation of the solvent.

21. The method as claimed in claim 20, wherein the particle diameter is adjusted by varying the polymer content of the spray solution.

22. A method for preparing luminescent microparticles as claimed in any of claims 11-13, wherein the luminescent compound is incorporated into compressed monolithic sol/gel glasses which are subsequently ground and fractionated according to size.

23. The use of the luminescent micro- and nanoparticles as claimed in any of claims 1 - 14 for labeling and luminometric detection of biomolecules from the group consisting of toxins, hormones, hormone receptors, peptides, proteins, lectins, oligonucleotides, nucleic acids, antibodies, antigens, viruses and bacteria.

24. The use of the luminescent micro- and nanoparticles as claimed in any of claims 1 - 14

as reference standards of fluorescence intensity signals in fluorimetric assays.

25. The use as claimed in claim 23, wherein addition of the standard to the sample converts the intensity information into a phase signal or/and a time-dependent parameter.

26. The use of the luminescent micro- and nanoparticles as claimed in any of claims 1 - 14 for referencing the luminescence intensity signal of optical luminescence sensors, wherein the particles are immobilized to a solid phase together with a luminescent indicator.

27. A method for luminometric determination of a biochemical or chemical parameter using two different luminescent dyes which have different decay times and the time or phase characteristics of the resulting luminescent response are used for generating a reference parameter for determination of said parameter, with the first luminescent dye corresponding to said parameter at least with respect to luminescence intensity and the second one not corresponding to said parameter at least with respect to luminescence intensity and luminescence decay time, characterized in that the second luminescent dye is used in the form of particles as claimed in any of claims 1-15.